

Structural Composites with Intrinsic Multifunctionality, Phase I

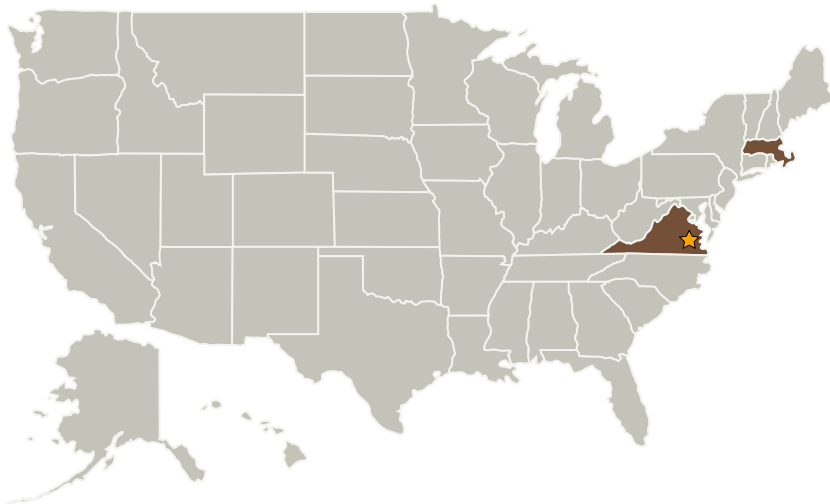
Completed Technology Project (2004 - 2004)



Project Introduction

Development of a multifunctional, structural material for applications in terrestrial and space-based platforms used for instrumentation in earth observation is proposed. The principal innovation is the development of an epoxy-based thermoset that undergoes a phase separation reaction during cure to form two interpenetrating networks of a structural thermoset (epoxy) phase and a second phase that is tailored to provide ancillary function. Both phases are co-continuous and nanostructured, having typical dimensions of 40-200 nm. The second phase has controllable viscoelastic properties to provide mechanical damping and other strain-rate dependent behavior. Additional functionality is obtained by sequestering appropriate materials into the second phase. Examples include reactive species for composite self-repair, ionizable salts to provide ionic conductivity, reducible and oxidizable materials for power source applications, and nanoscale materials, such as carbon nanotubes, for mechanical, electrical, and thermal properties enhancements. The thermoset will be used as a matrix in structural fiber composites. In Phase I, incorporation of functional species into the thermoset and fabrication of fiber composites will be demonstrated. In Phase II a structural composite for a specific NASA application would be developed. These multifunctional composites will reduce weight and allow incorporation of novel designs and functional features into terrestrial and space-based platforms.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

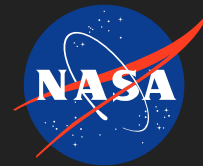
Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
EIC Laboratories, Inc.	Supporting Organization	Industry	Norwood, Massachusetts

Primary U.S. Work Locations

Massachusetts	Virginia
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Michael G Gilbert

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.1 Lightweight Structural Materials